

from the cross sectional area of the column. The myoglobin in the sample was concentrated by 37 fold, from 10  $\mu$ L, to 0.27  $\mu$ L. The average concentration in the band was about 18.5 mg/ml. Subtracting the volume of the packing, protein concentrations as high as 50 mg/ml can be obtained in focused bands in DFGF column.

For most proteins, the solubility is lowest in the buffer with pH equal to its pI. DFGF is generally carried out in a buffer with pH differing from the isoelectric point (pI) of the target proteins. For this reason, DFGF can provide highly concentrated protein bands in a low ionic strength buffer without precipitation.

The device of the present invention includes a focusing chamber. As noted above, the focusing chamber can include more than one electrode array. For example, two electrode arrays can be associated with a single separation chamber in a configuration in which the separation chamber is positioned in between the two arrays. Similarly, the focusing chamber can include, for example, four arrays positioned about a separation chamber in a quadrupole-type configuration. Representative devices including one, two, and four electrode arrays are illustrated schematically in FIGS. 25A–C. Referring to FIG. 25, representative device 10 including a single electrode array (i.e., electrode chamber 14) and a separation chamber (i.e., chamber 12) is shown in FIG. 25A. FIGS. 25B and 25C illustrate representative devices having two and four electrode arrays arranged about a separation chamber.

While the preferred embodiment of the invention has been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A device for focusing a charged solute comprising:

- a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber;
- a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and
- a porous material separating the first and second chambers;

wherein the electrode array comprises a plurality of electrodes arranged linearly along the chamber length, and wherein the electrodes are pin-shaped.

2. A device for focusing a charged solute comprising:

- a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber;
- a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and
- a porous material separating the first and second chambers;

wherein the electrode array comprises a plurality of electrodes arranged linearly along the chamber length, and wherein the electrodes are staple-shaped.

3. A device for focusing a charged solute comprising:

- a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber;

- a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and

- a porous material separating the first and second chambers;

wherein the electrode array comprises an electrode array positioned on a surface of the second chamber opposing the porous material.

4. A device for focusing a charged solute comprising:

- a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber;
- a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and
- a porous material separating the first and second chambers;

wherein the electrode array comprises a first electrode array and a second electrode array, the first and second arrays positioned on opposing surfaces of the second chamber adjacent the porous material.

- 5. A device for focusing a charged solute comprising:

- a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber;
- a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and
- a porous material separating the first and second chambers;

wherein the fluid medium comprises a chromatography support material.

6. A device for focusing a charged solute comprising:

- a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber;
- a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and
- a porous material separating the first and second chambers;

wherein the second chamber further comprises an electrode pair, wherein the electrodes of the pair are positioned adjacent opposing ends of the electrode array.

7. A device for focusing a charged solute comprising:

- a first block having a first trough machined therein for receiving a fluid medium, the first trough having an inlet for introducing a first liquid to the trough and an outlet for exiting the first liquid from the trough;
- a second block having a second trough machined therein, wherein the second block comprises a electrode array positioned in the trough, the second trough having an inlet for introducing a second liquid to the trough and an outlet for exiting the second liquid from the trough, wherein the first trough and the second trough are substantially coincident and form a channel when the first block is sealed to the second block; and